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FAIRCHILD SEMICONDUCTOR®

January 2000
Revised December 2005

NC7SB3257

2:1 Multiplexer/Demultiplexer Bus Switch

General Description

The NC7SB3257 is a high performance, 2:1 NMOS passgate multiplexer/demultiplexer. The device is fabricated with advanced sub-micron CMOS technology to achieve high speed enable and disable times and low On Resistance. The device is specified to operate over the 4.0 to 5.5V V_{CC} operating range. The control input tolerates voltages up to 5.5V independent of the V_{CC} operating range.

Features

- Space saving SC70 6-lead surface mount package
- Ultra small MicroPak™ leadless package
- Typical 3Ω switch resistance @ 5.0V V_{CC}
- Minimal propagation delay through the switch
- Power down high impedance control input
- Zero bounce in flow through mode
- TTL compatible control input
- Overvoltage tolerance of control input to 7.0V
- Break before make enable circuitry

Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7SB3257P6X	MAA06A	B7B	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7SB3257L6X	MAC06A	B7	Pb-Free 6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Pb-Free package per JEDEC J-STD-020B.

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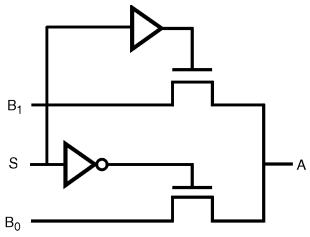
Logic Symbol



Pin Descriptions

Pin Names	Description
A, B_0, B_1	Data Ports
S	Control Input

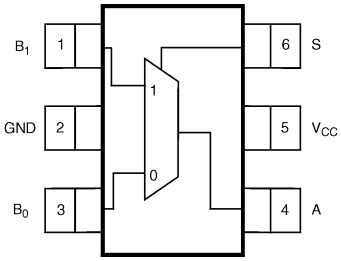
Function Table

Input (S)	Function
L	B_0 Connected to A
H	B_1 Connected to A

H = HIGH Logic Level
L = LOW Logic Level

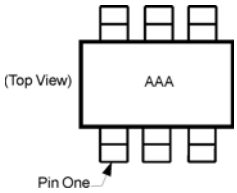
Connection Diagrams

Pin Assignments for SC70



(Top View)

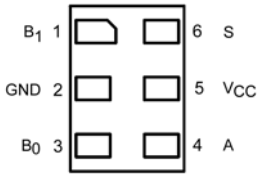
Pin One Orientation Diagram



AAA = Product Code Top Mark - see ordering code

Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignments for MicroPak



(Top Through View)

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Switch Voltage (V_S)	−0.5V to +7.0V
DC Output Voltage (V_{IN}) (Note 3)	−0.5V to +7.0V
DC Input Diode Current (I_{IK})	
@ (I_{IK}) V_{IN} < 0V	−50 mA
DC Output Current (I_{OUT})	128 mA
DC V_{CC} or Ground Current (I_{CC}/I_{GND})	±100 mA
Storage Temperature Range (T_{STG})	−65°C to +150°C
Junction Lead Temperature under Bias (T_J)	+150°C
Lead Temperature (T_L)	
(Soldering, 10 seconds)	+260°C
Power Dissipation (P_D) @ +85°C	180 mW

Recommended Operating Conditions (Note 2)

Supply Voltage Operating (V_{CC})	4.0V to 5.5V
Control Input Voltage (V_{IN})	0V to V_{CC}
Switch Input Voltage (V_{IN})	0V to V_{CC}
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	−40°C to +85°C
Input Rise and Fall Time (t_r, t_f)	
Control Input V_{CC} = 4.0V to 5.5V	0 ns/V to 5 ns/V
Thermal Resistance (θ_{JA})	350°C/W

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: Control input must be held HIGH or LOW, it must not float.

Note 3: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	T_A = −40°C to +85°C			Units	Conditions
			Min	Typ	Max		
V_{IK}	Clamp Diode Voltage	4.5			−1.2	V	I_{IN} = −18 mA
V_{IH}	HIGH Level Input Voltage	4.5 – 5.5	2.0			V	
V_{IL}	LOW Level Input Voltage	4.5 – 5.5			0.8		
I_{IN}	Input Leakage Current	5.5			±1.0	μA	0 ≤ V_{IN} ≤ 5.5V
I_{OFF}	OFF State Leakage Current	5.5			±1.0	μA	0 ≤ A, B ≤ V_{CC}
R_{ON}	Switch On Resistance (Note 4)	4.5		3.0	7.0	Ω	V_{IN} = 0V, I_{IN} = 64 mA
		4.5		3.0	7.0	Ω	V_{IN} = 0V, I_{IN} = 30 mA
		4.5		6.0	15.0	Ω	V_{IN} = 2.4V, I_{IN} = 15 mA
		4.0		10.0	20.0	Ω	V_{IN} = 2.4V, I_{IN} = 15 mA
I_{CC}	Quiescent Supply Current	5.5			10.0	μA	V_{IN} = V_{CC} or GND I_{OUT} = 0
ΔI_{CC}	Increase in I_{CC} Per Input (Note 5)	5.5		0.9	2.5	mA	V_{IN} = 3.4V, I_O = 0 Control Input Only

Note 4: Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).

Note 5: Per TTL driven Input (V_{IN} = 3.4V, Control input only). A and B pins do not contribute to I_{CC}.

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = -40°C$ to $+85°C$, $C_L = 50$ pF, RU = RD = 500Ω			Units	Conditions	Figure Number
			Min	Typ	Max			
t_{PHL} t_{PLH}	Propagation Delay Bus to Bus (Note 6)	4.0 – 55			0.25	ns	V_I = OPEN	Figures 1, 2
t_{PZL} t_{PZH}	Output Enable Time	4.5 – 5.5	1.8		6.5	ns	V_I = 7V for t_{PZL} V_I = 0V for t_{PZH}	Figures 1, 2
		4.0	1.8		7.3			
t_{PLZ} t_{PHZ}	Output Disable Time	4.5 – 5.5	0.8		4.7		V_I = 7V for t_{PLZ} V_I = 0V for t_{PHZ}	Figures 1, 2
		4.0	0.8		5.3			
t_{B-M}	Break Before Make Time (Note 7)	4.5 – 5.5	0.5			ns		Figure 3
		4.0	0.5					

Note 6: This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

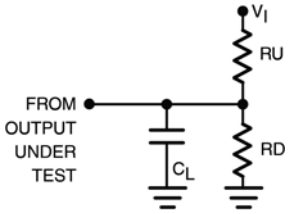
Note 7: Guaranteed by design.

Capacitance (Note 8)

Symbol	Parameter	Typ	Max	Units	Conditions
C_{IN}	Control Pin Input Capacitance	2.3		pF	V_{CC} = 0V
C_{IO-B}	B Port OFF Capacitance	5.7		pF	V_{CC} = 5.0V
C_{IO-A}	A Port ON Capacitance	16.0		pF	V_{CC} = 5.0V

Note 8: Capacitance is characterized but not tested.

AC Loading and Waveforms

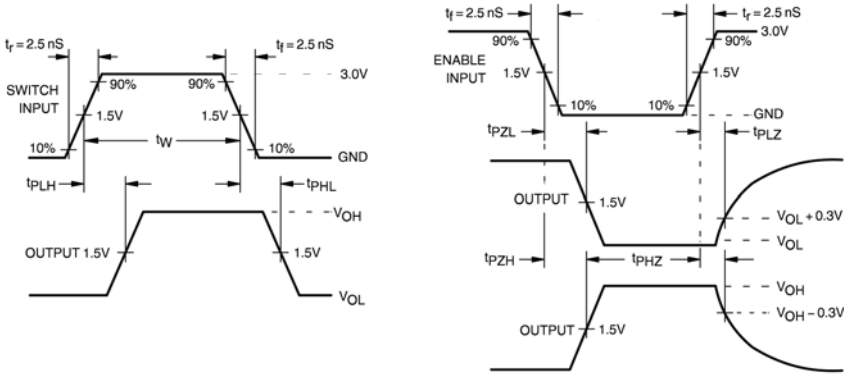


Note: Input Driven by 50Ω source terminated in 50Ω

Note: C_L includes load and stray capacitance

Note: Input PRR = 1.0 MHz; t_W = 500 ns

FIGURE 1. AC Test Circuit



Input = AC Waveform;
PRR = Variable; Duty Cycle = 50%

FIGURE 2. AC Waveforms

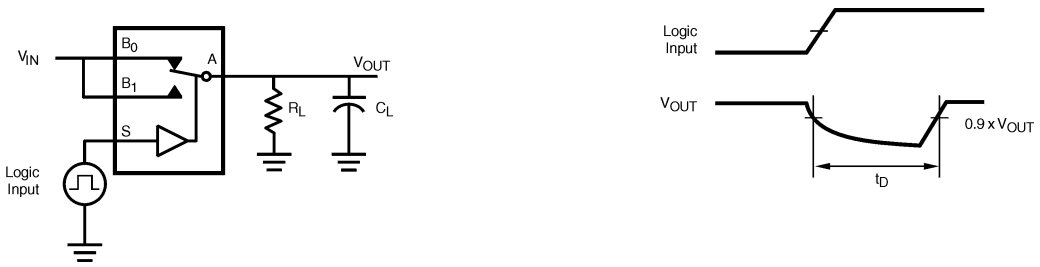


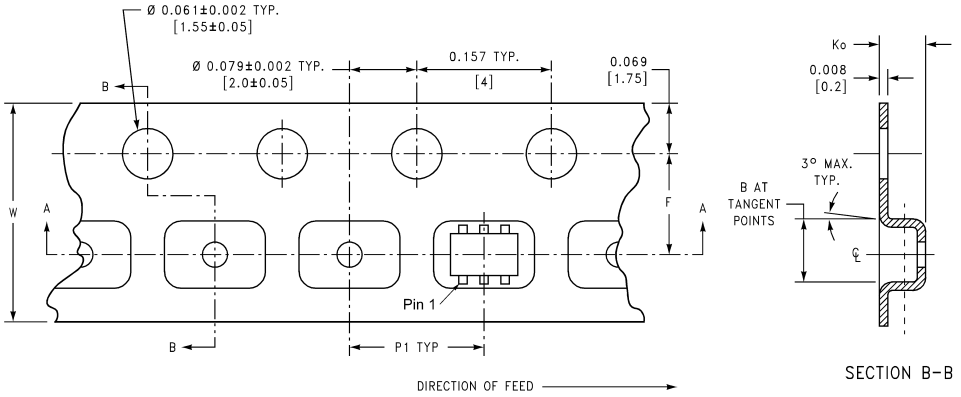
FIGURE 3. Break Before Make Interval Timing

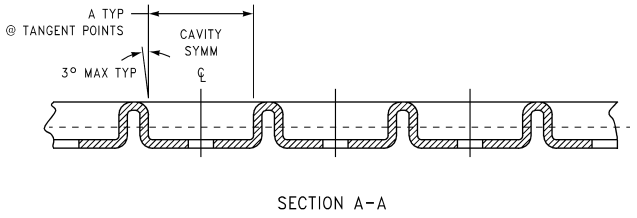
Tape and Reel Specification

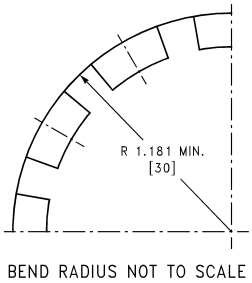
TAPE FORMAT for SC70

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
P6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



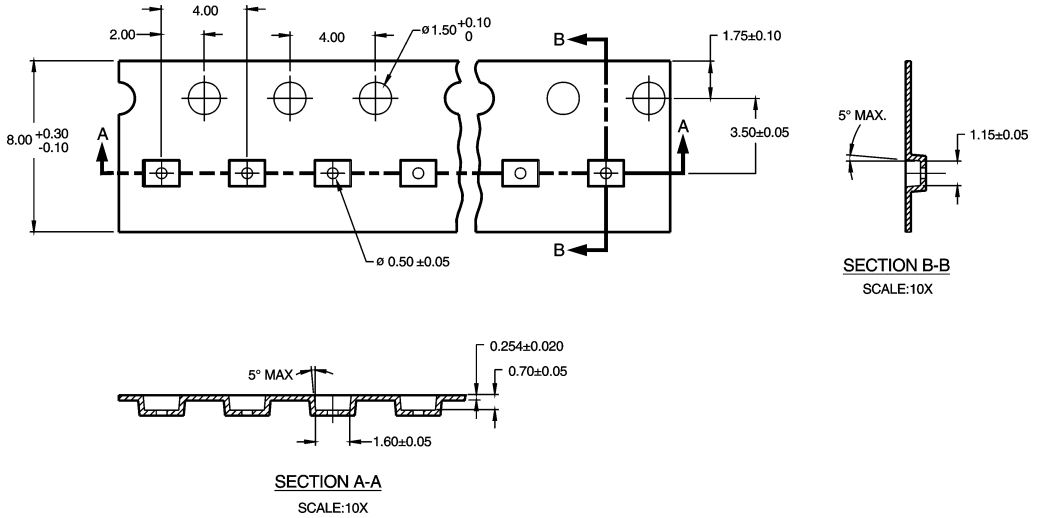




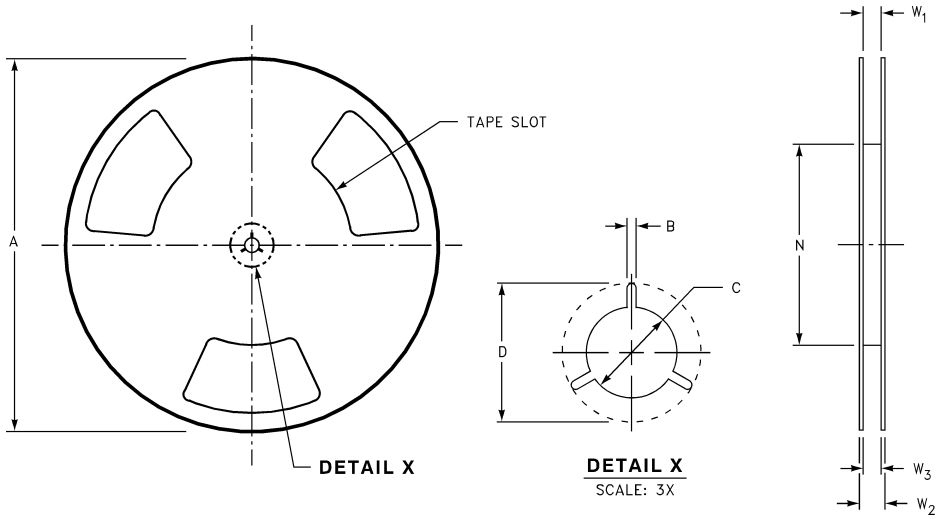
Package	Tape Size	DIM A	DIM B	DIM F	DIM K_o	DIM P1	DIM W
SC70-6	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)

TAPE FORMAT for MicroPak

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
L6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

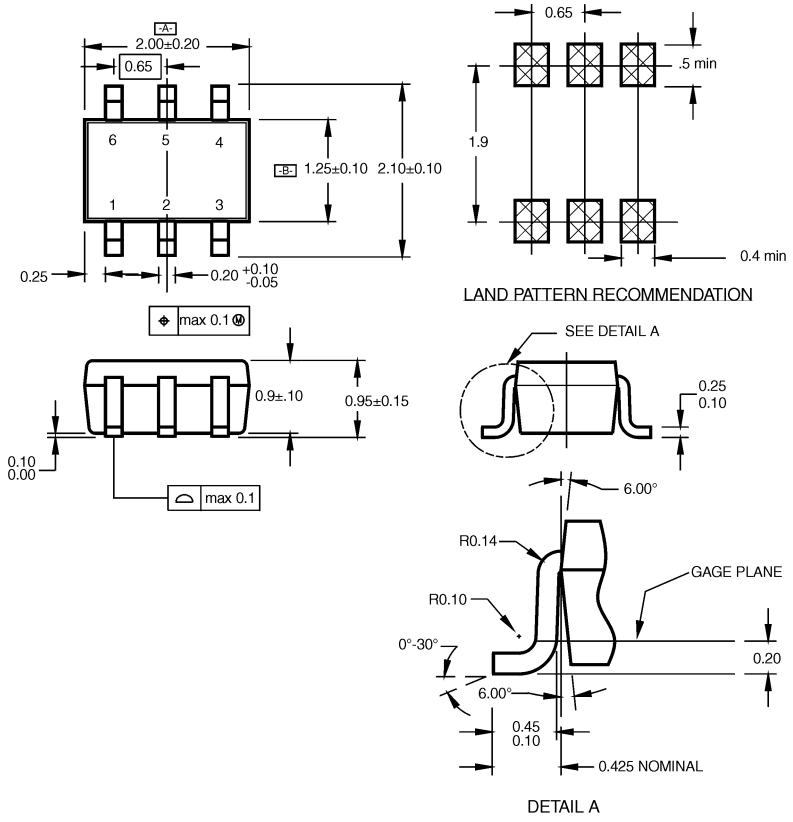


REEL DIMENSIONS inches (millimeters)



Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/–0.000 (8.40 + 1.50/–0.00)	0.567 (14.40)	W1 + 0.078/–0.039 (W1 + 2.00/–1.00)

Physical Dimensions inches (millimeters) unless otherwise noted



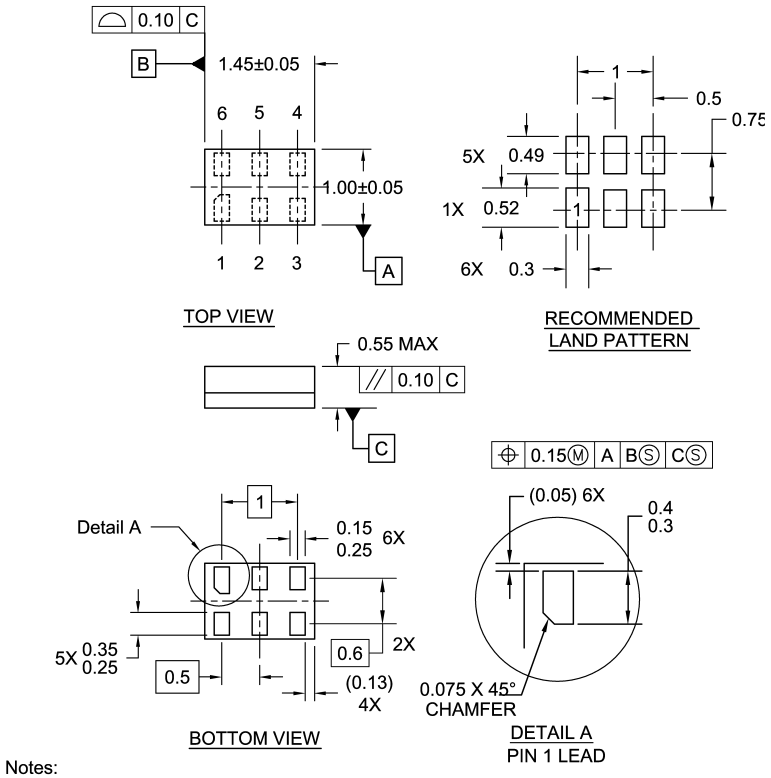
NOTES:

A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
C. DIMENSIONS ARE IN MILLIMETERS.

MAA06ARevC

6-Lead SC70, EIAJ SC88, 1.25mm Wide
Package Number MAA06A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Notes:

1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

Pb-Free 6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A

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